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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/050,134	01/18/2002	Yoichi Asano	Q68111	3810

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EXAMINER

YUAN, DAH WEI D

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 09/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/050,134

Applicant(s)

ASANO ET AL.

Examiner

Dah-Wei D Yuan

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,5,8,9 and 12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4,8 and 12 is/are allowed.
- 6) ☒ Claim(s) 1,5 and 9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Art Unit: 1745

**POLYMER ELECTROLYTE MEMBRANE, METHOD FOR PRODUCING SAME, AND
MEMBRANE ELECTRODE ASSEMBLY AND POLYMER ELECTROLYTE
FUEL CELL COMPRISING SAME**

Examiner: Yuan

S.N. 10/050,134

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September 24, 2004

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 19, 2004 has been entered. Claims 2,3,6,7,10,11 were cancelled. Claims 1,4,5,8,9,12 were amended.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on April 6, 2004.

Claim Rejections - 35 USC § 102

3. The claim rejections under 35 U.S.C. 102(b) as anticipated by Nolte et al. on claims 1,2,5,6,9,10 are withdrawn, because the independent claims 1,5,9 have been amended.

4. The claim rejections under 35 U.S.C. 102(e) as anticipated by Helmer-Metzmann et al. on claims 1,2,5,6,9,10 are withdrawn, because the independent claims 1,5,9 have been amended.

Claim Rejections - 35 USC § 103

5. The claim rejections under 35 U.S.C. 103(a) as unpatentable over Nolte et al. on claims 3,7,11 are withdrawn, because the independent claims 1,5,9 have been amended.

6. The claim rejections under 35 U.S.C. 103(a) as unpatentable over Helmer-Metzmann et al. on claims 3,7,11 are withdrawn, because the independent claims 1,5,9 have been amended.

Claim Rejections - 35 USC § 102/103

7. Claims 1,5,9 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nolte et al. (Journal of Membrane Science, 83 (1993) 211-220).

With respect to claim 1, Nolte et al. teach a polymer electrolyte membrane of sulfonated poly(arylene ether sulfones) with various sulfonation levels. Figure 2 shows structure of the polymer membrane having aromatic functional groups. Nolte et al. disclose the conversion of a poly(arylene ether sulfones) into polyelectrolytes (membrane) via functionalization of such polymer in a post-polymerization step. Specifically, the poly(arylene ether sulfone) receives a sulfonation treatment, which comprises a hot water treatment at about 80°C. See Abstract, pages 211-213. Nolte et al. do not specifically disclose the maximum water absorption in a range of 80-300 weight% based on its dry weight before the hot water treatment. However, it is the position of the examiner that such properties are inherent, given that the materials recited in both Nolte et al. and the present application having similar chemistry and chemical structure. A

reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference*. In re Robertson, 49 USPQ2d 1949 (1999).

It is noted that claims 1,5,9 are product-by-process claims. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Since Nolte's actual polymer electrolyte membrane is similar to that of the Applicant's, Applicant's process is not given patentable weight in this claim.

With respect to claim 5, Nolte et al. further teach the polymer electrode membrane is sandwiched between two electrode/catalyst in a solid polymer fuel cell. See Figure 1.

With respect to claim 9, Nolte et al. further teach the fuel cell comprising end plates (separator plates) in the membrane electrode assembly. See Figure 1.

8. Claims 1,5,9 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Helmer-Metzmann et al. (US 6,096,856) as evidenced by Nolte et al. (Journal of Membrane Science, 83 (1993) 211-220).

With respect to claim 1, Helmer-Metzmann et al. teach a polymer electrolyte membrane of polyarylene sulfide having aromatic units. A chlorosulfonated material is suspended in water

and the suspension is boiled (a hot water treatment), so that the polyarylene sulfide-sulfonic acid chloride is converted into the polyarylene sulfide-sulfonic acid. See Column 1, Lines 9-61; Column 2, Lines 6-25,64-67. Helmer-Metzmann et al. do not specifically disclose the maximum water absorption in a range of 80-300 weight% based on its dry weight before the hot water treatment. However, it is the position of the examiner that such properties are inherent, given that the materials recited in both Helmer-Metzmann et al. and the present application having similar chemistry and chemical structure. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature *is necessarily present in that which is described in the reference*. In re Robertson, 49 USPQ2d 1949 (1999).

It is noted that claims 1,5,9 are product-by-process claims. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Since Helmer-Metzmann's actual polymer electrolyte membrane is similar to that of the Applicant's, Applicant's process is not given patentable weight in this claim.

With respect to claim 5,9, Helmer-Metzmann et al. further teach the polymer electrode membrane can be used in electrochemical cells, in particular in fuel cells and electrolysis cells. See Column 3, Lines 18-31. The fuel cells inherently comprise electrode and separator plates as evidenced by Nolte et al. See Figure 1.

Allowable Subject Matter

9. Claims 4,8,12 are allowed. The following is a statement of reasons for the indication of allowable subject matter: The invention of independent claims 4,8,12 recites a polymer electrolyte membrane obtained by subjecting an ion-conducting, aromatic polymer membrane to a hot-water treatment, wherein said ion-conducting, aromatic polymer membrane is a sulfonated polyarylene membrane, and wherein the sulfonated polyarylene is a sulfonated arylene copolymer obtained by introducing a sulfonic group into a side chain of a copolymer comprising 30-95 mol % of a first aromatic monomer unit represented by a chemical formula (1) and 70-5 mol% of a second aromatic monomer unit represented by the chemical formula (2). The closest prior arts of record, Helmer-Metzmann et al. and Nolte et al., do not disclose or suggest. the polymer comprising 30-95 mol% of a first aromatic monomer unit represented by the formula (1) and 70-5 mol% of a second aromatic monomer unit represented by the chemical formula (2) as stated in the claim.

Response to Arguments

10. Applicant's arguments filed on July 19, 2004 have been fully considered but they are not persuasive.

Applicant's principle arguments are

(a) Nolte describes a process for purifying a raw sulfonated poly(arylene ether sulfone) , which is not in a membrane form;

(b) inherency is not supportive of obviousness (albeit it might be supportive of anticipation);

(c) the properties of the sulfonated poly(arylene ether sulfones) of Nolte are inherently different from those of the sulfonated polyarylenes of the present invention;.

(d) Helmer-Metzmann does not suggest to one of ordinary skill in the art a hot water treatment by subjecting a sulfonated polyarylene membrane in hot water.

In response to Applicant's arguments, please consider the following comments.

(a) Nolte teach the use of a sulfonated poly(arylene ether sulfone) as a proton conducting membrane material. The hot water treatment is one of the processing steps that lead to the formation of a polymer electrolyte membrane. Examiner agrees with the statement by the Applicant that the hot water treatment is carried out before the membrane is cast. However, no clear distinctions can be drawn from materials that are subjected to hot water treatment before and after the formation of membrane. Applicant is encouraged to submitted additional information to substantiate his position;

(b) The express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. "The inherent teaching of a prior art reference, a question of fact, arises both in the context of anticipation and obviousness." In re Napier, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir.1995) (affirmed a 35 U.S.C. 103 rejection based in part on inherent disclosure in one of the references). See also In re Grasselli, 713 F.2d 731, 739, 218 USPQ 769, 775 (Fed. Cir. 1983). See MPEP 2112;

(c) the goal of Nolte is to develop a technique to crosslink the sulfonated poly(arylene ether sulfone) electrolytes during membrane processing in order to substantially reduce water swelling without impairing other membrane properties such as proton conductivity. See Abstract. Evidently, the sulfonation of the ion-conducting, aromatic polymer of Nolte would qualify it as a membrane for use in a fuel cell;

(d) Helmer-Metzmann et al. teach the sulfonated polyarylene sulfide prepared by the disclosed process, including a hot water treatment, can be used as a membrane in electrochemical cells. The polymer molecules in the membrane have been subjected to a hot water treatment in the manufacturing history.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei D. Yuan whose telephone number is (571) 272-1295. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dah-Wei D. Yuan
September 27, 2004

A handwritten signature in black ink, appearing to read "D. Yuan", with a long horizontal flourish extending to the right.